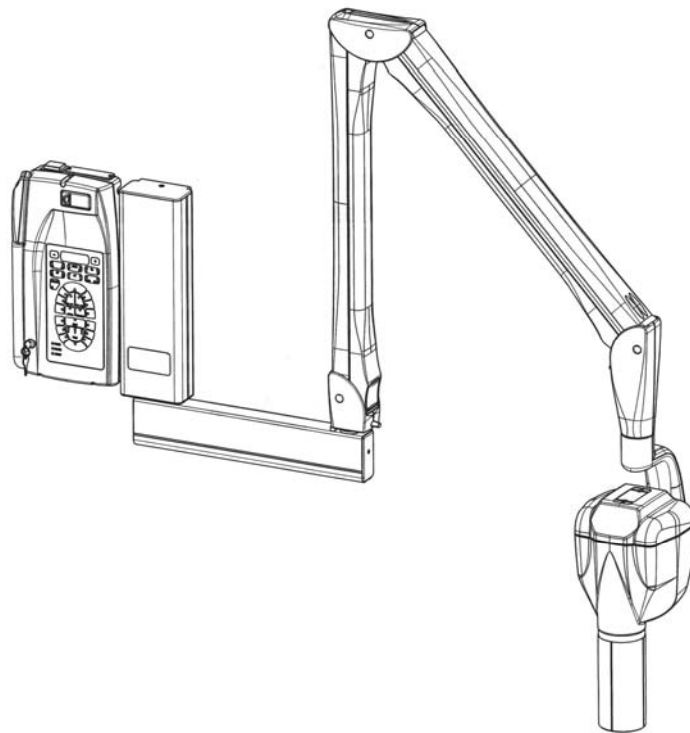


X-Mind[®] DC

Intraoral x-ray system at constant potential

USER'S MANUAL

CE
0434



This manual should always be kept in proximity to the device

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INTRODUCTION

The radiographic system described in this manual is a **“wall installation”**.

SATELEC® S.A.S. reserves the right to modify its products and manual without notice.

SATELEC® S.A.S. shall not be liable for any incorrect use of the information contained in this manual.

Any copies, even partial, of this manual are permitted solely for in-house use.

PRELIMINARY INFORMATION

Before beginning to use the “X-Mind® DC” X-ray system, it is advisable to carefully read and follow the instructions contained herein should be carefully read and followed, in order to obtain the best possible performance.

Always pay close attention to the **CAUTION**, **WARNING** and **PLEASE NOTE** messages when operating the system.

LEGEND



CAUTION

*The word **CAUTION** identifies those situations which might compromise **the operator's personal safety or cause personal injuries**.*



WARNING

*The word **WARNING** identifies those situations which might compromise **the X-ray system's performance**.*

PLEASE NOTE

*The words **PLEASE NOTE** are used to give special indications to facilitate maintenance or make important information clearer.*

USER INFORMATION

Dear Customer,
Thank you for having chosen the "X-Mind® DC" X-ray system.

It was designed and manufactured by "de Götzen® S.r.l." in collaboration with "Satelec® S.A.S." and is the result of many years of experience in the fields of radiology and advanced electronics applications.

This high performance system represents ongoing development of technological research serving dental radiography.

It is delivered with all the necessary technical documentation, which must always be kept close at hand for reference.

PLEASE NOTE

This manual does not contain all the recommendations and the obligations with respect to the possession of a source of ionizing radiation - as they vary from country to country - but only the most common ones.

The user must consult his country's legislation in order to comply with all local ordinances.

WARRANTY CONDITIONS

Inappropriate use or any arbitrary tampering with the equipment shall release "de Götzen® S.r.l." or "Satelec® S.A.S.", the manufacturer of the "X-Mind® DC" system, from any warranty service or liability.

The warranty is valid only if the following precautions are taken:

- ✓ any repairs, modifications, adjustments, re-calibrations must be performed only by "de Götzen® S.r.l." for "Satelec® S.A.S."
- ✓ installation must be done by professionally qualified technicians. pursuant to existing regulations
- ✓ the system must be installed and used in compliance with the instructions set forth in this Manual and for the purposes and applications for which it was designed
- ✓ the power supply must be adequate to supply the required power indicated in the X-ray system's nameplate data
- ✓ in order to safeguard the warranty rights, please fill in the enclosed Warranty Document, immediately completion of the installation , with the help of the technician

TRANSPORT CONDITIONS

The "X-Mind® DC" X-ray system shall be shipped at the receiver's sole risk.

All claims for damages or shipping loss with respect to the shipment must be noted in the presence of the shipping agent.

In case of shipping losses, or actual or suspected damage, the receiver shall note the appropriate reserves on the way-bill or the consignment note.

SAFETY WARNINGS

A few safety recommendations are listed below which should be followed when using the "X-Mind® DC" radiographic system.



PROTECTION AGAINST RADIATION

"The general principles regarding safety and protection of workers and people" must always be applied when using the unit:

1. Justification of the practice
2. Protection Optimization (ALARA)
3. Reduction of individual dose limits and risks

The X-ray system may only be used by authorized and qualified personnel.

All personnel present during the radiological examination must comply with safety measures established with respect to radiation protection.

For his or her own safety, the operator must always remain at least 2 meters from the tube head.

To protect the patient from unnecessary exposure to radiations, additional anti-radiation protection may be used whenever necessary (i.e. aprons, collars, etc...)



This symbol calls ATTENTION to the danger of X-rays



ELECTRICAL SAFETY

The X-ray system contains high voltage.

When inspecting internal parts, always turn off the power before handling any electrical part.

The unit must be used only in environments which comply with all electric safety standards for medical environments.

The unit is NOT equipped with protection against penetration by liquids; it is therefore necessary to ensure that no water or other liquids penetrate the device, in order to avoid short circuits or corrosion.

Always disconnect the X-ray system from the power supply before cleaning and disinfecting operations.



MECHANICAL RISK

Before removing the tube head from the positioning arm, RELEASE THE SPRING, as the joint might burst open and hit the operator.



PROTECTION AGAINST EXPLOSIONS

The X-ray system MUST NOT be used in the presence of disinfectants, flammable or potentially explosive gases or vapors which might catch fire and cause damage.

In the event that disinfectants must be used, allow the vapor to disperse completely before turning on the X-ray system.

1. "X-Mind® DC" X-RAY SYSTEM

The "X-Mind® DC" X-ray system guarantees maximum safety for both the operator and the patient.

It has been manufactured in compliance with the following European Directives:

- ▶ directive 93/42/EEC on MEDICAL DEVICES and its amendments
- ▶ directive 73/23/EEC on LOW VOLTAGE and its integration
- ▶ directive 89/336/EEC on ELECTROMAGNETIC COMPATIBILITY
- ▶ directive EURATOM 96/29 on ionizing radiation

and the following American Standard:

- ▶ American Radiation Performance Standard 21 CFR, Subchapter J

The following protective measures were adopted in the design and construction of the unit:

- ✓ Protection against the risk of electrical injuries, ensured by a grounded cable
- ✓ Protection against radiation leakage , rendered negligible by the shielded casing
- ✓ Protection against excessive radiation, thanks to immediate activation of the safety device
- ✓ Protection against continuous service, since the system is designed, according to standards, so as not to allow radiological overuse
- ✓ Protection against exposure errors, by means of network compensation software, ensuring constant blackening
- ✓ Patient protection against dangerous radiations, through the improvement of the quality of the radiation through the addition of an aluminum filter, in compliance with standards
- ✓ Operator protection against irradiation ensured by the extendable hand control cable ,l which provides a buffer zone of over 2 meters
- ✓ Protection against the involuntary selection of "film" or "digit", obtained, in compliance with standards, by means of the confirmation of the selected touch key

"ELECTRO-MEDICAL" CLASSIFICATION

Pursuant to paragraph 5 of the general safety regulations EC EN 60 601-1/1998 on medical equipment safety, the system is classified as: **Class I - Type B**

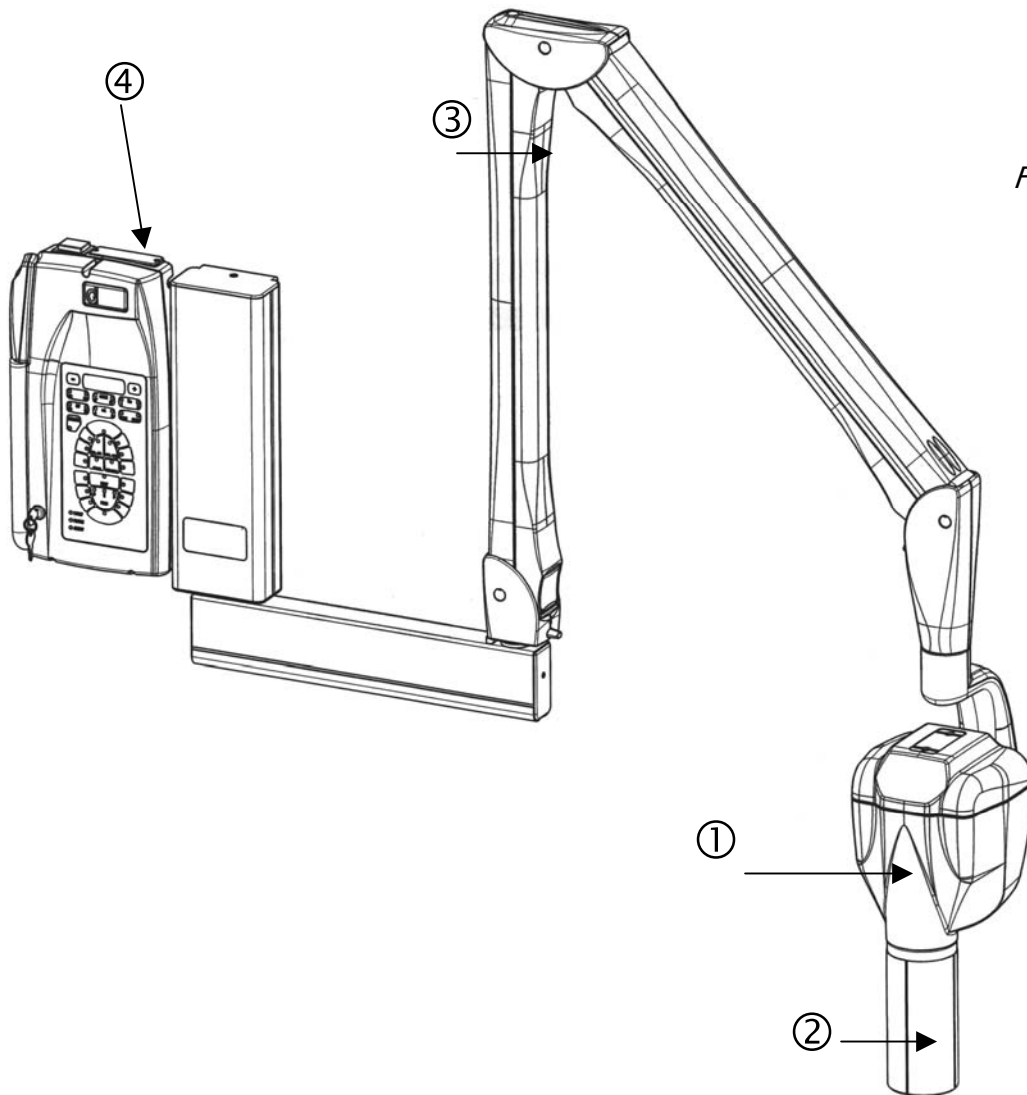
"MEDICAL DEVICES" CLASSIFICATION

Pursuant to the classification rules set forth in attachment IX of the EEC Directive 93/42 on medical devices, the system is classified as: **Class IIb**

"E.M.C." CLASSIFICATION

Pursuant to paragraph 4 of the EEC EN 55011, the system is classified as: **Group 1 - Class B**

2. SYSTEM COMPONENTS



3. IDENTIFICATION TAGS

The **X-Mind® DC** X-ray system (Fig. 1) consists of:

① Tubehead

The tubehead is of the "monoblock" type with following characteristics:

- ▶ high frequency generator at "constant potential"
- ▶ double anode voltage 60kVp - 70kVp
- ▶ double anode current 4mA - 8mA

The light alloy housing is divided into two compartments.

The high voltage transformer, the X-ray tube and the expansion chamber are submerged in highly dielectric insulating oil inside a light alloy container.

The second compartment contains the electronic main board and the electronic control board.

The X-ray tube is located in the back part of the housing thus allowing a focal spot to skin distance (SSD) which is 50% higher than the traditional structure.

② Spacer Cone

Made of transparent polycarbonate, it allows for:

- ▶ correct focal spot to skin distance
- ▶ dimension, direction and centering of the X-ray beam
- ▶ use of different x-ray techniques (bisecting and parallel techniques)

③ Pantograph type arm

Thanks to the new shape and new mechanisms of the positioning arm, the height and depth can be adjusted so as to precisely explore any spot in its reach.

It is made of light alloy with an "ABS" coating.

④ Timer

The timer is the control panel used to manage the times and to safely use the tubehead.

It is "multi-technology" type and it is able to control both **AC** and **DC** x-ray systems.

The "CONTROL BUTTON" with safety button is used for the exposure.

The timer can be connected to n° 2 tubeheads:

n° 2 ALTERNATE CURRENT "AC" X-RAY UNITS: "X-Mind® AC"

or

n° 2 DIRECT CURRENT "DC" X-RAY UNITS: "X-Mind® DC"

or

n° 1 ALTERNATE CURRENT "AC" + n° 1 DIRECT CURRENT "DC" X-RAY UNITS:
"X-Mind® AC" + "X-Mind® DC"

OPTIONAL

- short 8" (20 cm) cone - NOT AVAILABLE IN U.K.
- long cone 12" (31 cm) with a rectangular section - dimensions: 44x35 mm
- second "CONTROL BUTTON" with extension cable
- RX signaling lamp for external use: X-Mind® LIGHT
- remote control button: X-Mind® ECB

The identification tags on the tubehead, on the timer and on the cone indicate the model name, the serial number, the manufacturing date and the symbols of the main technical characteristics.

Made by "de Götzen s.r.l. Italy" for SATELEC Z.I. du Phare 33700 Merignac France

CE 0434 X-MIND DC
70 kVp 8 mA Total filtration: 2 mm Al at 70 kV
Nominal voltage: V \pm 15% Class I Type B - IP20
SN: Manufactured:
Tube TOSHIBA DG073B-DC SN: 0.7

ID TAG OF THE
"X-Mind® DC"
TUBEHEAD

Made by "de Götzen s.r.l. Italy" for SATELEC Z.I. du Phare 33700 Merignac France

CE 0434 X-MIND
Rated line voltage: V~ 50 - 60 Hz
Max line current: A Class I Type B - IP20
SN: Manufactured:

ID TAG OF THE
"X-Mind® DC"
TIMER

Cono Limitatore Beam Limiting Device S./N.:	Mfg. Date:	Made by "Ets de Götzen® Srl ITALY" for SATELEC XMind	Champ irradié à la peau: Effective Beam at Cone Tip:	60 mm (31 cm DFP) 60 mm (31 cm SSD)
--	------------	---	---	--

ID TAG OF THE LONG 12" CONE

Cono Limitatore Beam Limiting Device S./N.:	Mfg. Date:	Made by "Ets de Götzen® Srl ITALY" for SATELEC XMind	Champ irradié à la peau: Effective Beam at Cone Tip:	60 mm (20 cm DFP) 60 mm (20 cm SSD)
--	------------	---	---	--

ID TAG OF THE SHORT 8" CONE

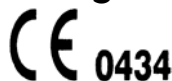
Collimateur Beam Limiting Device S./N.:	Mfg. Date:	Made by "Ets de Götzen® Srl ITALY" for SATELEC XMind	Champ irradié à la peau: Effective Beam at Cone Tip:	44x35 mm (31 cm DFP) 44x35 mm (31 cm SSD)
--	------------	---	---	--

ID TAG OF THE RECTANGULAR CONE

60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 0 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60

GRADUATED SCALE TAG

Pictograms used



This symbol guarantees that the x-ray system complies with the regulations contained in the European Directive EEC 93/42 regarding Medical Devices



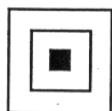
The degree of protection against direct and indirect electric contacts is B type



Refer to Manual's instructions

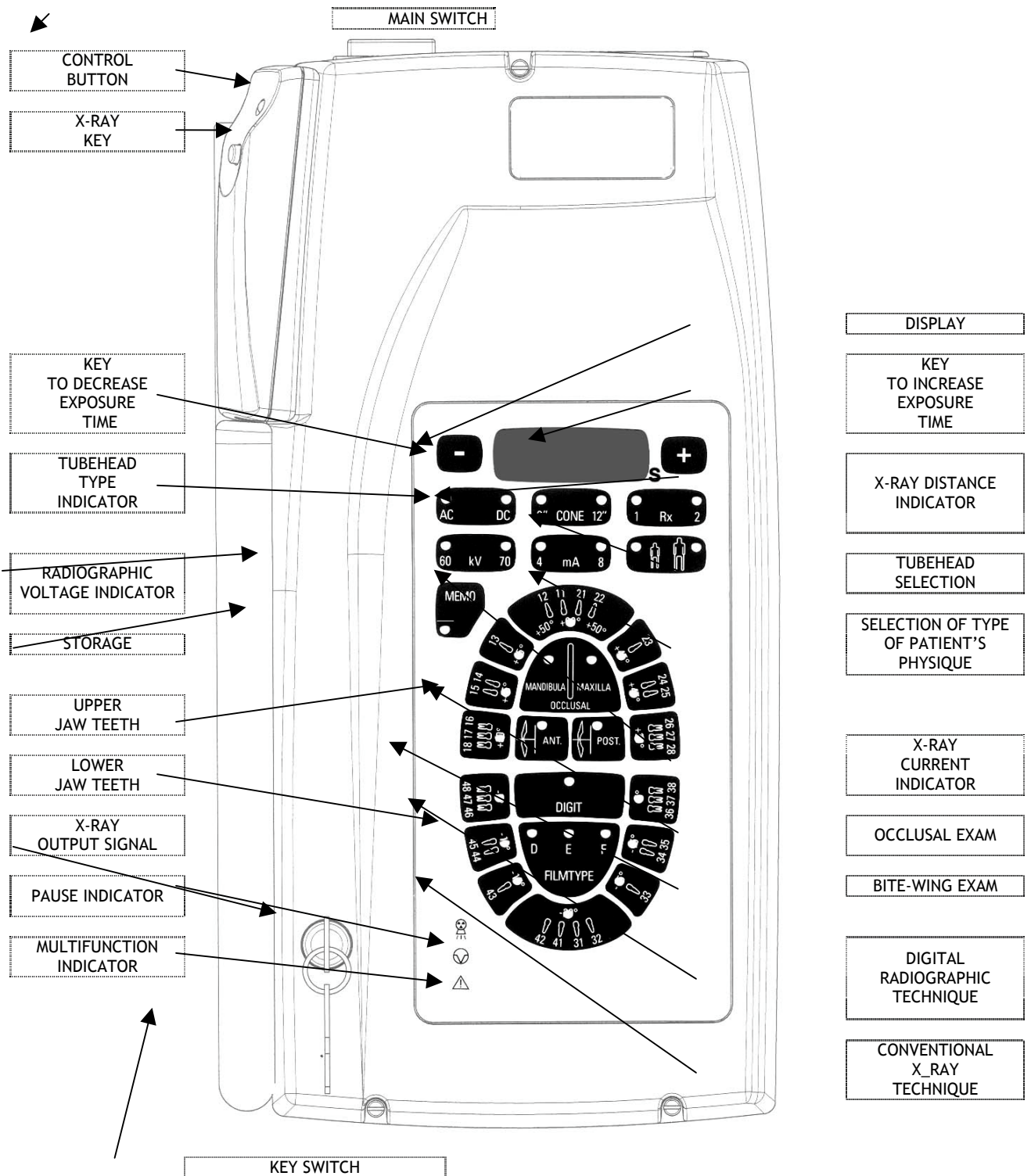


Symbol indicating danger due to "ionizing radiations"






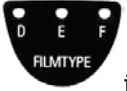
Size of the focal spot

4. CONTROL PANEL



5. SYSTEM CONFIGURATION

A. The "X-Mind® DC" x-ray system is factory configured for an operative "standard mode" which determines:

N° 2 "X-Mind® DC" tubeheads	⇒	 on the control panel by pressing the RX button Led 1 lights up, by pressing the button again, Led 2 lights up
** IF THE LONG 12" (31cm) CONE IS USED **		
an x-ray distance SSD = 31cm (source skin distance) with long 12" cone	⇒	on the control panel Led 12"  is lit
** IF THE SHORT 8" (20cm) CONE IS USED **		
an x-ray distance SSD = 20cm (source skin distance) with short 8" cone	⇒	on the control panel Led 8"  is lit
with type "D" film	⇒	the control panel Led "D"  is lights up
n° 1 CONTROL BUTTON to perform the exposure	⇒	The timer houses a key with extension cable

The configuration may be changed if:

POSSIBLE MODIFICATION	HOW TO CARRY OUT THE MODIFICATIONS
<ul style="list-style-type: none"> - use type "E" and "F" films - use a digital system - use a voltage equal to 60 kV - use a current equal to 4 mA 	⇒ <i>refer to USER'S MANUAL 56 "USE INSTRUCTIONS"</i>
<ul style="list-style-type: none"> - use the short 8" (20cm) cone is - use the long 12" (31cm) cone is - use one single tubehead - use a tubehead with "ac" technology - use n° 2 CONTROL BUTTON 	⇒ by changing the dip-switch position <u>THIS OPERATION MUST BE CARRIED OUT BY THE INSTALLER ONLY</u>

B. The following exposure times have been stored in the "xmind®dc" x-ray system:

0.020 - 0.025 - 0.032 - 0.040 - 0.050 - 0.063 - 0.080 - 0.100 - 0.125 - 0.160 - 0.200 -
 0.250 - 0.320 - 0.400 - 0.500 - 0.630 - 0.800 - 1.00 - 1.250 - 1.600 - 2.000 - 2.500 -
 3.200 sec

PLEASE NOTE

These times comply with current CEI EN 60601-2-7 (1999) standards and with the ISO 497 series R'10 recommendations.
 This programmed exposure times MAY NOT be modified.

C. In the "X-Mind® DC" x-ray system to further simplify and speed up the operations to select times of exposure, certain exposure times have been predefined which depend on:

- ▶ the x-ray distance: 12" or 8"
- ▶ the x-ray technique: FILM or DIGIT
- ▶ the patient's body size: ADULT or CHILD
- ▶ the type of intra-oral test: PERIAPICAL, OCCLUSAL, BITE-WING

PLEASE NOTE

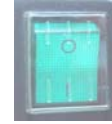
If one so desires, it is possible to change the "PREDEFINED EXPOSURE TIME VALUES"
 (refer to §9 "PROGRAMMING DEFAULT EXPOSURE VALUES")

6. USE INSTRUCTIONS

Here below is the suggested operative sequence for a correct exposure:

1. TURN ON THE TIMER to power the radiographic system

- a. Press the "MAIN SWITCH" located on the upper part of the timer to the "I" position (ON)



- b. Turn the "KEY SWITCH" to the "I" position (ON)




- the green light turns on indicating that the system is powered up
- the Leds of the set x-ray parameters automatically light up
- the exposure time is shown on the display

- c. THE RADIOGRAPHIC SYSTEM IS NOW READY FOR USE



CAUTION

If an error is detected when the system is turned on, the anomaly is indicated as follows:

- *an intermittent beep sounds*
- *the "MALFUNCTIONING INDICATOR"  Led intermittently turns on*
The error code (E) appears on the display
(refer to §12 "ERROR MESSAGES")
- *All "Control Panel" functions are inhibited*

*In this case, turn off the timer and then turn it back on.
If the error should repeat itself, call Customer Support.*

PLEASE NOTE

The exposure time and x-ray parameters which appear on the display are the last that were set before the timer was turned off.

PLEASE NOTE

If installed, outside the office, the RX signaling lamp, corresponding to the selected tubehead turns on.


PLEASE NOTE

If the timer remains inactive for a few minutes, it switches to stand-by mode.
Press any key on the "Control Panel" to restore it to operating mode.

2. CHECK THE SELECTED EXPOSURE PARAMETERS

Before making the exposure check that the "Control Panel" selected parameter (from Step 1 to Step 6) are suitable for the x-ray exam.

STEP 1 ➡ Check the selected tubehead

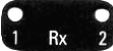
The  Led of the desired tubehead should be turned on:

Led Rx1 **ON**

indicates that the tubehead connected to the timer XRAY1 terminal block is selected

Led Rx2 **ON**

indicates that the tubehead connected to the timer XRAY2 terminal block is selected


To change the selection press the button "RX" 

STEP 2 ➡ Check the selected tubehead type

The DC  Led should be lit

If the DC Led is not lit call Customer Support

STEP 3 ➡ Check the selected x-ray distance

The  Led of the desired SSD should be lit

Led 12" SSD = 31 cm

Led 8" SSD = 20 cm

If Led is NOT lit call Customer Support



CAUTION

The assembled cone must be the cone corresponding to the selected SSD.

STEP 4 ➡ Check the selected x-ray technique

IF YOU ARE
WORKING WITH
CONVENTIONAL
FILMS



Check that the Led for the desired speed film is lit

Led "D" ON
indicates that the system is set for use with "D" speed film

Led "E" ON
indicates that the system is set for use with "E" speed film

Led "F" ON
indicates that the system is set for use with "F" speed film

To change the speed film, press "FILMTYPE" and keep it pressed for 3 sec. until the beep sounds

PLEASE NOTE

After modification, default exposure values will be automatically changed.

PLEASE NOTE

With conventional films it is advisable to use a x-ray of 8mA (see STEP 7)

IF YOU ARE
WORKING WITH
A DIGITAL
ACQUISITION
SYSTEM
(CCD OR
EQUIVALENT)



Check that the Led is lit

To change the speed film, press "DIGIT" and keep it pressed for 3 sec. until the beep sounds

PLEASE NOTE

After modification, default exposure values will be automatically changed.

PLEASE NOTE

With the sensor it is advisable to use a stet current of 4mA (see STEP 7)

STEP 5 ➡ Check the selected patient type

The  desired patient led of the should be lit

Led Child ON

indicates that the system is set for a patient with a small physique

Led Adult ON

indicates that the System is set for a patient with a large physique

To change the selection press the button located between the two icons "CHILD/ADULT".

PLEASE NOTE

After modification, default exposure values will be automatically changed.

STEP 6 ➡ Check the selected x-ray voltage

The  Led of the desired voltage should be lit

Led 60 kV ON

indicates that the system is set with the "HIGT CONTRAST" radiodiagnostic technology

Led 70 kV ON

indicates that the system is set with the "LOW CONTRAST" radiodiagnostic technology

To change the selection press the "kV" button

PLEASE NOTE

After modification, default exposure values will be automatically changed.

STEP 7 ➡ Check the selected x-ray current

The  desired current led of the should be lit

Led 8 mA ON

indicates that the system is set for "NOMINAL DOSE".

The use of "CONVENTIONAL FILMS (FILM)" is advisable

Led 4 mA ON

indicates that the system is set for "REDUCED DOSE".

The use of "DIGITAL SYSTEMS (FILM)" is advisable

To change the selection press the "mA" button



PLEASE NOTE

After modification, default exposure values will be automatically changed.

STEP 8 ➡ Check the intra-oral test selected

**FOR A
PERIPHERAL
EXAM**

The Led for the desired tooth must be on



To change the selection, press the key for the desired tooth

**FOR AN
OCCLUSAL
EXAM**



Check that the Led is lit

MANDIBULA Led ON

indicates that the system is set for the OCCLUSAL exam of the LOWER JAW

MAXILLA Led ON

indicates that the system is set for the OCCLUSAL exam of the UPPER JAW

To change the selection, press the "OCCLUSAL"

**FOR A
BITE-WING
EXAM**



Check that the Led or the Led is lit.

ANT Led ON

indicates that the system is set for the exposure time needed for the FRONT BITE-WING EXAM

POST Led ON

indicates that the system is set for the exposure time needed for the BACK BITE-WING EXAM

To change the selection, press the key of the desired "BITE-WING" exam

3. POSITIONING THE PATIENT

Following the standard intra-oral procedures:

- position the patient
- position the patient's head

4. POSITIONING THE FILM/SENSOR

Position either the "FILM" or the "DIGITAL SENSOR" depending on the technique to be used:

- bisecting angle technique or short (8") cone technique
- parallel technique or long (12") cone technique

5. POSITIONING THE CONE

Following the standard positioning procedures bring the cone of the tubehead towards the patient and precisely in the direction of the film or digital sensor

PLEASE NOTE

To correctly orient the cone it is advisable to use the graduated scale indicated on the tubehead.

6. CHECK ON THE SELECTED TIME DISPLAY

Before proceeding with the exposure, check on the selected time display

To modify, use the  key or the  key



WARNING

This modification at the exposure time is momentary and will be lost unless it is saved. (refer to §9 "PROGRAMMING DEFAULT EXPOSURE VALUES")

PLEASE NOTE

To restore the previous values, press one of the keys with the led turned off on the "Control Panel".

7. MAKING THE EXPOSURE

Now that the exposure parameters are optimal, the exposure may be made.



1. Take the "CONTROL BUTTON" of the timer



WARNING

If "CONTROL BUTTON" N.2 (optional) is installed:

- ⇒ use "CONTROL BUTTON" n° 1 for tube head 1 (Rx1)
- ⇒ use "CONTROL BUTTON" n° 2 for tube head 2 (Rx2)


2. Using the extendable cable of the "CONTROL BUTTON" to maintain a buffer zone of 2 meters from the tube head and be able to constantly check the radiological exposure
3. Advise the patient to remain still
4. Press the key  "X-RAY" and keep it pressed until the acoustic signal (beep) stops and the yellow "X-RAY OUTPUT SIGNAL"  Led turns off

PLEASE NOTE

If the "X-RAY" key is released early, the exposure is immediately interrupted and the E12 error message appears on the display.

8. THE END OF EXPOSURE

At the end of the exposure:

- a. the green "PAUSE INDICATOR"  Led indicates the pause period
- b. the display indicates the actual duration of the exposure
- c. all the timer functions are inhibited

PLEASE NOTE

The pause time is necessary to allow the X-ray tube to cool down.
This time is calculated by the microprocessor, depending on the exposure time, with a ratio of 1:32 (32 seconds of pause are required for each second of exposure).



**A NEW EXPOSURE WILL BE POSSIBLE AFTER THE GREEN LED HAS TURNED OFF
(REPEAT THE OPERATIVE SEQUENCE FROM POINT 2 TO POINT 8)**

7. CHART OF DEFAULT EXPOSURE VALUES FOR THE 12" CONE


The chart indicates the "X-Mind® DC" X-ray system's predefined exposure values (refer to §5: "SYSTEM CONFIGURATION")




⇒ CONVENTIONAL X-RAY TECHNIQUE (FILM)

		ADULT																								
PROGRAMMED EXPOSURE TIMES (sec)		0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s		
70kV - 8mA																										70kV - 8mA
FILM D	MAXILLA												I	CP Bp	M	Op										
	MANDIBLE												I	CP Ba	M	-	Oa									
FILM E	MAXILLA										I	CP Bp	M	Op												
	MANDIBLE									I	CP Ba	M	-	Oa												
FILM F	MAXILLA									I	CP Bp	M	Op													
	MANDIBLE								I	CP Ba	M	-	Oa													
60kV - 8mA																										60kV - 8mA
FILM D	MAXILLA															I	CP Bp	M	Op							
	MANDIBLE														I	CP Ba	M	-	Oa							
FILM E	MAXILLA													I	CP Bp	M	Op									
	MANDIBLE												I	CP Ba	M	-	Oa									
FILM F	MAXILLA												I	CP Bp	M	Op										
	MANDIBLE											I	CP Ba	M	-	Oa										
		CHILD																								
PROGRAMMED EXPOSURE TIMES (sec)		0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s		
70kV - 8mA																										70kV - 8mA
FILM D	MAXILLA												I	CP Bp	M	Op										
	MANDIBLE										I	CP Ba	M	-	Oa											
FILM E	MAXILLA									I	CP Bp	M	Op													
	MANDIBLE								I	CP Ba	M	-	Oa													
FILM F	MAXILLA									I	CP Bp	M	Op													
	MANDIBLE								I	CP Ba	M	-	Oa													
60kV - 8mA																										60kV - 8mA
FILM D	MAXILLA														I	CP Bp	M	Op								
	MANDIBLE													I	CP Ba	M	-	Oa								
FILM E	MAXILLA												I	CP Bp	M	Op										
	MANDIBLE											I	CP Ba	M	-	Oa										
FILM F	MAXILLA												I	CP Bp	M	Op										
	MANDIBLE										I	CP Ba	M	-	Oa											

⇒ DIGITAL X-RAY TECHNIQUE (CCD or similar)

ADULT																								
PROGRAMMED EXPOSURE TIMES (sec)	0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s	
70kV - 4mA																								70kV - 4mA
MAXILLA						I	CP Bp	M	Op															
MANDIBLE					I	CP Ba	M	-	Oa															
60kV - 4mA																								60kV - 4mA
MAXILLA									I	CP Bp	M	Op												
MANDIBLE								I	CP Ba	M	-	Oa												

CHILD																								
PROGRAMMED EXPOSURE TIMES (sec)	0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s	
70kV - 4mA																								70kV - 4mA
MAXILLA					I	CP Bp	M	Op																
MANDIBLE				I	CP Ba	M	-	Oa																
60kV - 4mA																								60kV - 4mA
MAXILLA									I	CP Bp	M	Op												
MANDIBLE								I	CP Ba	M	-	Oa												

LEGEND

I	INCISOR
C	CANINE
P	PREMOLAR
M	MOLAR

Ba	ANTERIOR BITE-WING
Bp	POSTERIOR BITE-WING
Oa	ANTERIOR MANDIBLE OCCLUSAL
Op	POSTERIOR MANDIBLE OCCLUSAL

PLEASE NOTE

To modify the default exposure times.
(refer to § 9: "PROGRAMMING DEFAULT EXPOSURE VALUES")

8. CHART OF DEFAULT EXPOSURE VALUES FOR THE 8" CONE


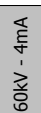
The chart indicates the “X-Mind® DC” X-ray system’s predefined exposure values
(refer to § 5 “SYSTEM CONFIGURATION”)


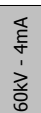


⇒ CONVENTIONAL X-RAY TECHNIQUE (FILM)

[illegible][illegible]

⇒ DIGITAL X-RAY TECHNIQUE (CCD or similar)

ADULT																				
PROGRAMMED EXPOSURE TIMES (sec)	0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	
70kV - 4mA																				
MAXILLA			I	C P Bp	M	Op														
MANDIBLE		I	C P Ba	M	-	Oa														
60kV - 4mA																				
MAXILLA						I	C P Bp	M	Op											
MANDIBLE					I	C P Ba	M	-	Oa											

CHILD																				
PROGRAMMED EXPOSURE TIMES (sec)	0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	
70kV - 4mA																				
MAXILLA		I	C P Bp	M	Op															
MANDIBLE	I	C P Ba	M	-	Oa															
60kV - 4mA																				
MAXILLA						I	C P Bp	M	Op											
MANDIBLE				I	C P Ba	M	-	Oa												

LEGEND

I	INCISOR
C	CANINE
P	PREMOLAR
M	MOLAR

Ba	ANTERIOR BITE-WING
Bp	POSTERIOR BITE-WING
Oa	ANTERIOR MANDIBLE OCCLUSAL
Op	POSTERIOR MANDIBLE OCCLUSAL

PLEASE NOTE

To modify the default exposure times.
(refer to § 9" PROGRAMMING DEFAULT EXPOSURE VALUES")

9. PROGRAMMING DEFAULT EXPOSURE VALUES



WARNING

The 17 programmed exposure times (refer to § 5.B "SYSTEM CONFIGURATION") **MAY NOT** be modified in the "X-Mind® DC" X-ray system, you may, however, customize the default exposure values (refer to § 5.C "SYSTEM CONFIGURATION")



WARNING

After customizing, the "Chart of default exposure values" (refer to § 7 "CHART OF DEFAULT EXPOSURE VALUES FOR THE 12" CONE" and § 8 "CHART OF DEFAULT EXPOSURE VALUES FOR THE 8" CONE") **ARE NO LONGER VALID**.

To program the new exposure values, proceed as follows:

1. Modify the exposure time on the display by pressing the



key or the



PLEASE NOTE

The "repeat" function automatically activates when the key is kept depressed, allowing the time shown on the display to scroll faster.

2. Check the



Led

When the **MEMO** Led is **OFF**, it is **NOT** possible to save data

When the **MEMO** Led is **lit**, it is possible to save data

3. Press the




key and keep it depressed for 3 seconds until the acoustic signal sounds to save the new default exposure values

PLEASE NOTE

It is **NOT** possible to save data when the "range of exposure field" exceeds the programmed exposure time limits (refer to the example on the next page).


Example:

⇒ PREDEFINED EXPOSURE VALUES

ADULT																										
PROGRAMMED EXPOSURE TIMES (sec)		0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s		
70kV - 8mA																										70kV - 8mA
FILM D	MAXILLA												I	C P Bp	M	Op										
	MANDIBLE												I	C P Ba	M	-	Oa									
FILM E	MAXILLA										I	C P Bp	M	Op												
	MANDIBLE									I	C P Ba	M	-	Oa												
FILM F	MAXILLA									I	C P Bp	M	Op													
	MANDIBLE								I	C P Ba	M	-	Oa													

⇒ CUSTOMIZED DEFAULT EXPOSURE VALUES

(The range of exposure entered has been reduced by two steps)


ADULT																									
PROGRAMMED EXPOSURE TIMES (sec)		0.020s	0.025s	0.032s	0.040s	0.050s	0.063s	0.080s	0.100s	0.125s	0.160s	0.200s	0.250s	0.320s	0.400s	0.500s	0.630s	0.800s	1.000s	1.250s	1.600s	2.000s	2.500s	3.200s	
70kV - 8mA																									
FILM D	MAXILLA										I	C P Bp	M	Op											
	MANDIBLE										I	C P Ba	M	-	Oa										
FILM E	MAXILLA								I	C P Bp	M	Op													
	MANDIBLE							I	C P Ba	M	-	Oa													
FILM F	MAXILLA							I	C P Bp	M	Op														
	MANDIBLE						I	C P Ba	M	-	Oa														
70kV - 8mA																									

	I	C P Bp	M	Op	RANGE OF EXPOSURE FIELD
I	C P Ba	M	-	Oa	

10. RESTORING ORIGINAL VALUES

To restore factory settings, proceed as follows:

1. Turn the timer off

2. While keeping the  key depressed and turn on the timer

3. **OFF** will appear on the display

4. Release the  key

5. Press the  key again

6. **ON** will appear on the display

7. Turning the timer on and off will restore the factory settings

11. DIAGNOSTICS

The "X-Mind® DC" X-ray system allows the user to display certain functional parameters.

To display them, proceed as follows:

- a. Simultaneously press and keep pressing the keys marked
(17) MAXILLA MOLAR + (47) MANDIBLE MOLAR



- b. Press the key associated with the parameter one wishes to view:

KEY		DISPLAYED PARAMETER	Example	M.U.
	BITE-WING ANT	X-RAY SYSTEM NOMINAL VOLTAGE	230	Volt
	BITE-WING POST	LINE VOLTAGE	227	Volt
	UPPER INCISOR	MAXIMUM LINE VOLTAGE VALUE DETECTED	238	Volt
	LOWER INCISOR	MINIMUM LINE VOLTAGE VALUE DETECTED	215	Volt
	OCCLUSAL	SOFTWARE VERSION	2.3	

12. ERROR MESSAGES

The following chart gives a list of error messages that may appear while the "X-Mind® DC" X-ray system is in operation.

The chart also includes the causes of the error messages and what to do to resolve them.

Error Message	Cause	Solution
E00	RX1 TUBEHEAD IS NOT CONNECTED OR IS OUT OF ORDER	CALL THE "SUPPORT DEPARTMENT"
E01	RX2 TUBEHEAD IS NOT CONNECTED OR IS OUT OF ORDER	CALL THE "SUPPORT DEPARTMENT"
E02	CORRUPTED EEPROM DATA	CALL THE "SUPPORT DEPARTMENT"
E03	EEPROM DATA NOT SAVED PROPERLY	CALL THE "SUPPORT DEPARTMENT"
E05	LINE VOLTAGE VALUE NOT WITHIN SET LIMITS	CALL THE "SUPPORT DEPARTMENT"
E07	LINE VOLTAGE VALUE NOT WITHIN THE \pm 15% NOMINAL VALUE	CALL THE "SUPPORT DEPARTMENT"
E08	THE "X-RAY" KEY ALWAYS SEEMS TO BE PRESSED	ENSURE IT IS NOT JAMMED
E09	ANOMALY IN THE CONTROL PANEL	CALL THE "SUPPORT DEPARTMENT"
E12	THE EXPOSURE HAS BEEN PREMATURELY INTERRUPTED	KEEP THE "X-RAY KEY" PRESSED UNTIL THE END OF THE EXPOSURE
E20	ANOMALY IN THE TRIAC/RELAY	CALL THE "SUPPORT DEPARTMENT"
E21	ANOMALY IN THE ELECTRONIC CIRCUIT	CALL THE "SUPPORT DEPARTMENT"
E22	ANOMALY IN THE CONTROL CIRCUIT	CALL THE "SUPPORT DEPARTMENT"
E23	INCORRECT DIP-SWITCH CONFIGURATION	CALL THE "SUPPORT DEPARTMENT"
E24	THE "CONTROL BUTTON" DOES NOT CORRESPOND TO THE SELECTED TUBEHEAD	SELECT THE "CONTROL BUTTON" THAT CORRESPONDS TO THE SELECTED TUBEHEAD
E30	THE TUBEHEAD DOES NOT WORK PROPERLY	CALL THE "SUPPORT DEPARTMENT"
E32	THE TUBEHEAD IS NOT IN THE CORRECT MODE	CALL THE "SUPPORT DEPARTMENT"

E33	THE TUBEHEAD HAS NOT COMPLETED THE EXPOSURE	REPEAT THE EXPOSURE OR CALL THE "SUPPORT DEPARTMENT"
E40	PROBLEM IN THE FREQUENCY OR REGULATION	CALL THE "SUPPORT DEPARTMENT"
E41	THE TUBEHEAD IS NOT CALIBRATED	CALIBRATE THE TUBEHEAD OR CALL THE "SUPPORT DEPARTMENT"
E42	EEPROM DATA NOT SAVED PROPERLY	CALL THE "SUPPORT DEPARTMENT"
E43	CORRUPTED EEPROM DATA	CALL THE "SUPPORT DEPARTMENT"
E44	OVERVOLTAGE ERROR	CALL THE "SUPPORT DEPARTMENT"
E45	ANODE VOLTAGE OUT OF TOLERANCE	CALL THE "SUPPORT DEPARTMENT"
E46	ANODE CURRENT OUT OF TOLERANCE	CALL THE "SUPPORT DEPARTMENT"
E47	CONTROL CONNECTOR	CALL THE "SUPPORT DEPARTMENT"
E48	PROBLEM IN THE REFERENCE VOLTAGE	CALL THE "SUPPORT DEPARTMENT"
Err	MAJOR ERROR	ALL X-RAY SYSTEM FUNCTIONS ARE DISABLED CALL THE "SUPPORT DEPARTMENT"

13. SYSTEM TECHNICAL DATA

POWER SUPPLY CHARACTERISTICS

◆ TYPE OF POWER SUPPLY	at constant potential	
◆ NOMINAL VOLTAGE	230 V	115 V
◆ MAXIMUM VOLTAGE VARIATION	± 15 %	± 15 %
◆ NOMINAL CURRENT	6A	12 A
◆ FREQUENCY	50/60Hz	50/60Hz
◆ POWER EMITTED	1.4 kVA	1.4 kVA
◆ APPARENT LINE RESISTANCE	0.5 Ω	0.2 Ω
◆ PROTECTIVE FUSES (F1 - F2 - F3 - F4) (quick fuse)	8AF - 250 V	12..5AF - 250 V
◆ CIRCUIT PROTECTIVE FUSES (LOCATED ON THE SECONDARY OF THE	(F5) n° 1 mini-fuse 630 mA to 125V axial (F6) n° 1 mini-fuse 500 mA to 125V axial	

X-RAY SYSTEM - TECHNICAL DATA

◆ GENERATOR	at constant potential at 200 kHz frequency		
◆ HIGH NOMINAL VOLTAGE	60 kV - 70 kV		
◆ NOMINAL CURRENT	4 mA - 8 mA		
◆ NOMINAL ELECTRIC POWER AT 0...1 sec	560 W	70 kV	8 mA
	480 W	60 kV	8 mA
	280 W	70 kV	4 mA
	240 W	60 kV	4 mA
◆ REFERENCE CURRENT-TIME PRODUCT	0.8 mAs	8 mA	0.1 sec
	0.4 mAs	4 mA	0.1 sec
◆ INTENSITY OF RADIATION IN THE AIR	>30 µGy/h at 1 meter away from focal spot		
◆ TOTAL FILTRATION	equivalent to 2 mm Al at 70kV		
◆ HALF VALUE LAYER (HVL) AT 70 kV	> 1.6 mm Al		
◆ RADIATION LEAKAGE	less than 0..25 mGy/h at 1 meter from focal spot		
◆ LINEARITY	10 %		
◆ REPRODUCIBILITY	0.05		
◆ ELECTRICAL CLASSIFICATION	Class "I" - Type "B" - Intermittent Service		

MEASUREMENT CONDITIONS

- ◆ kVp non-invasive measurement
- ◆ mAs direct measurement with digital instrument
- ◆ EXPOSURE TIME (sec) "non-invasive" measurement with digital

ACCURACY OF TECHNICAL DATA

- ◆ NOMINAL VOLTAGE OF X-RAY TUBE $\pm 10 \%$
- ◆ NOMINAL CURRENT OF THE X-RAY TUBE $\pm 10 \%$
- ◆ SELECTED EXPOSURE TIME
 ± 0.005 from 0.020 to 0.1 sec
 ± 5 from 0.125 to 3.2 sec

WEIGHT

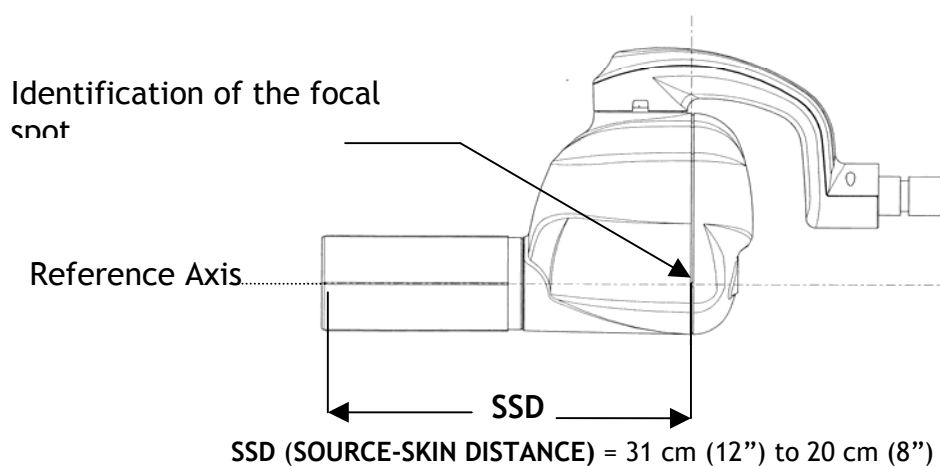
- ◆ TOTAL WEIGHT 25 Kg.
- ◆ WEIGHT OF TUBEHEAD 5.5 Kg.

ENVIRONMENTAL CHARACTERISTICS

- ◆ OPERATING TEMPERATURE $+5^{\circ}\text{C}$ $+40^{\circ}\text{C}$
- ◆ WAREHOUSE TEMPERATURE -15°C $+50^{\circ}\text{C}$
- ◆ HUMIDITY 25 % - 75 %

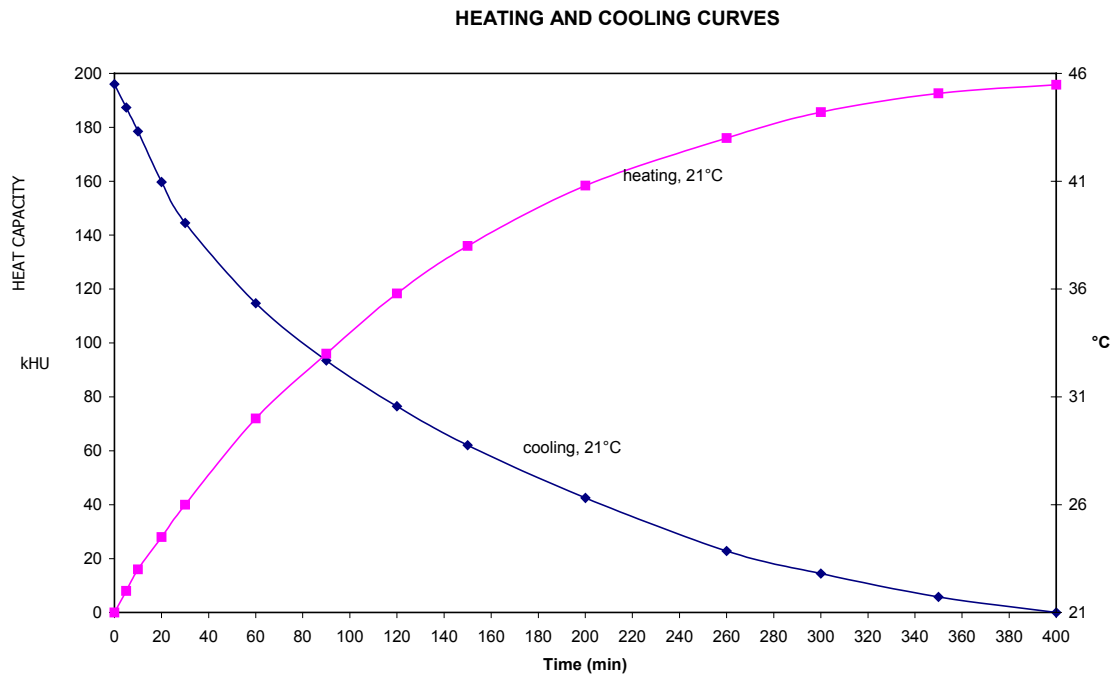
TECHNICAL CONE DATA

- ◆ SOURCE-SKIN DISTANCE (SSD)
SHORT 8" CONE 20 cm (8")
LONG 12" CONE 31 cm (12")
RECTANGULAR CONE 31 cm (12")
- ◆ DIAMETER OF X-RAY BEAM
WITH 8" OR 12" CONE ≤ 60 mm
WITH RECTANGULAR CONE 44x35 mm



THERMAL CHARACTERISTICS OF THE TUBEHEAD

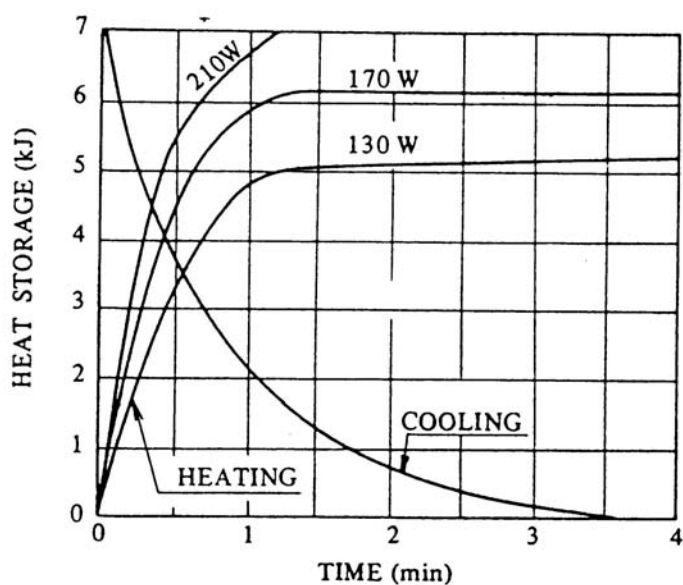
- ◆ TUBEHEAD'S HEAT ACCUMULATION CAPACITY 140 kJ (196 kHU)
- ◆ MAXIMUM COOLING SPEED 1.2 kJ/min (1.8 kHU/min)



X-RAY TUBE TECHNICAL DATA

◆ X-RAY TUBE	TOSHIBA DG-073B-DC
◆ SIZE OF FOCAL SPOT	0.7 - (IEC 336/1993)compliant
◆ NOMINAL ANODE VOLTAGE	70 kV
◆ NOMINAL ANODE CURRENT	8 mA
◆ NOMINAL ANODE POWER	560 W (70 kV - 8 mA - form factor = 1)
◆ EXPOSURE TIME	0.08 ÷ 3.2 sec in 17 steps
◆ NOMINAL HIGH VOLTAGE AND MAXIMUM CURRENT	70kV - 8 mA ±10 %
◆ TUBE INHERENT FILTRATION	equivalent to 0.8 mm Al
◆ ANODE MATERIAL	tungsten
◆ ANODE INCLINATION	20°
◆ ANODE HEAT LOAD	7 KJ (10 kHU)
◆ MAXIMUM CONTINUOUS HEAT	17.5 W
◆ OPERATING CYCLE	1:32

ANODE THERMAL CHARACTERISTICS



14. SUGGESTED MAINTENANCE

In order to guarantee the safety of the X-ray system, a maintenance schedule must be set up.

The owner is responsible for setting up and adhering to a schedule for maintenance which must be executed by qualified technicians who are able to certify their work with a "Compliance Declaration".



CAUTION

Run a check on the system and its operation when it is installed and every twelve months thereafter.

Once a year, lubricate the pins and bushes of the wall plate and positioning arm, as specified (refer to *INSTALLATION & MAINTENANCE MANUAL* §15 "MAINTENANCE")



WARNING

Do not lose the adjustment key that comes with the system, since, in time, it might become necessary to make readjustments.



WARNING

If parts become hard to move or squeak, call "Customer Support".

15. CLEANING THE OUTER SURFACES

Use a damp soft cloth and soapy water to clean the outer surfaces.

The spacer cone may be cleaned with cotton wool and surgical alcohol.

16. IF A REPAIR BECOMES NECESSARY

In the event of a malfunction, send the defective part (IN THE ORIGINAL PACKAGING) to:

Satelec® S.A.S.
Z.I. du Phare
B.P. 216
33708 MERIGNAC cedex - France

Tel. +33 (0) 556 34 06 07
Fax +33 (0) 556 34 92 92

E-mail: info@satelec.com

17. DISPOSAL

The components and packaging must not be disposed of in a manner which is environmentally harmful.

In particular, the dielectric oil as well as the shielding lead must be disposed of by specialized companies which are authorized to deal with the disposal of waste material.

18. ACCESSORIES

The manufacturer undertakes to supply, upon request, drawings, circuit diagrams, component parts lists, instructions or other information needed by qualified technical personnel to perform repairs on those parts of the "X-Mind® DC" X-ray system which may be repaired.

